

Data communications and Encoding

1. A signal has a bandwidth of 20 Hz. The highest frequency is 60 Hz. What is the lowest frequency? The signal's frequency content is analysed to a resolution of 5 Hz. Every component is found to have the same amplitude of A volts. Draw the spectrum of the signal.
2. A signal has a spectrum with frequencies between 1000 and 2000 Hz (bandwidth of 1000 Hz). A medium can pass frequencies from 3000 to 4000 Hz (a bandwidth of 1000 Hz). Can this signal faithfully pass through this medium?
3. In a Communication Channel, it was found that the Signal-to-Noise Ratio is 27 dB. Assume that the communication line has the bandwidth of 3 kHz, calculate the Channel Capacity for this connection.

Also, find the number of levels required for the Channel Capacity.

4. Assume a data stream is made of the following bit sequence 0 0 0 1 0 0 1 0 1 1 1. Encode this stream, using the following encoding schemes.
 - a) Unipolar
 - b) NRZ-L
 - c) NRZ-I
 - d) Manchester
 - e) Differential Manchester